

Empowering Teachers through the Development of Articulate Storyline-Based Digital Learning Media on Climate Change Education

Elyana Putri¹, Nurul Hidayati Rofiah^{2*}

Correspondence

^{1,2} Universitas Ahmad Dahlan

nurulhidayati@pgsd.uad.ac.id

Abstract:

Climate change is a vital topic in elementary science education, yet it remains challenging for students to grasp due to its abstract nature. At the same time, many teachers face limitations in developing digital-based instructional media. This study aimed to create interactive learning media using Articulate Storyline for fourth-grade students and to empower teachers by involving them in both the development and implementation processes. The research employed the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation). Field testing with 21 students showed a notable improvement in learning outcomes, with average pre-test and post-test scores of 51.66 and 86.38, respectively. The N-Gain score of 0.70 indicates that the media was effective in enhancing student understanding. Moreover, teacher participation in the development process contributed to improved digital literacy and pedagogical skills, especially in integrating technology into classroom instruction. The Articulate Storyline-based media proved to be both practical and effective for elementary science learning, supporting the goals of the Merdeka Curriculum, which emphasizes differentiated instruction and the integration of educational technology.

Keyword: Learning Media, Articulate Storyline, Climate Change, Learning Outcomes, Elementary School, Teacher Empowerment

Received: 31 July 2025. Accepted: 20 August 2025

Introduction

The development of technology today is not limited to the field of computing but has expanded into education. Digital technologies have become increasingly utilized in educational institutions as tools to support both the access and delivery of learning materials (Lestari, 2018; Sviri et al, 2024). In academic settings, technology can serve as both an information source and a medium that supports learning activities and assignments. With its dual function, educational technology plays a strategic role in helping achieve the intended learning outcomes. When appropriately implemented, it encourages active engagement and supports student-centered learning environments.

The shift toward the Merdeka Curriculum in Indonesia represents a significant transformation in the national education system, aiming to return greater autonomy to schools and teachers while placing students at the center of the learning process (Pratiwi et al, 2024; Marpaung, 2024). This curriculum reform emphasizes learner agency, critical thinking, creativity, collaboration, and contextualized instruction that caters to students' interests, developmental stages, and local contexts. One of its key principles is differentiated learning, which allows teachers to adapt content, process, and assessment according to students' diverse needs (Eikeland & Ohna, 2022;

Mills et al., 2014). The curriculum also encourages project-based and inquiry-based approaches that cultivate independent learning and holistic development (Adeoye et al., 2024).

To support this flexible and student-centered learning framework, the Merdeka Curriculum requires the integration of diverse and engaging learning resources, particularly instructional media that leverage digital technology (Hunaepi & Suharta, 2024; Junarti et al., 2023). These media are expected to enhance students' motivation and understanding, particularly in subjects such as science and environmental education that are abstract or complex. However, the successful implementation of the curriculum has encountered several challenges on the ground. In many elementary schools, teachers still struggle with limited capacity in designing and utilizing technology-based media due to a lack of professional development and digital literacy (Sahelatua, et al., 2019). As a result, the potential of the Merdeka Curriculum to transform classroom practices remains underutilized, particularly in underserved or resource-constrained educational settings.

Learning media plays an essential role in creating engaging learning environments. It acts as a channel to convey messages and information from teachers to students, stimulating attention and interest (Rahmawati et al., 2022; Umarella, 2018). Setiyawan (2020) emphasizes that media functions to control the flow of information during instruction, where the teacher acts as the sender and the student as the receiver. The choice of media should therefore consider its flexibility, durability, and alignment with the characteristics of student learning. Among various educational technologies, Articulate Storyline stands out as an effective multimedia tool that allows the combination of text, images, animation, audio, and quizzes, creating interactive learning environments (Firdawela & Reinita, 2021; Rianto, 2020).

Articulate Storyline is particularly useful for supporting independent learning and fits well with the principles of the Merdeka Curriculum. It helps students learn at their own pace in a more enjoyable and less pressured atmosphere. Moreover, it allows teachers to design media that are tailored to curriculum goals and students' cognitive levels. However, its use requires technical know-how, which many teachers currently lack. This is evident from findings at Muhammadiyah Ambarbinangun Elementary School, where teachers reported difficulty in developing digital content and using instructional media. Additionally, classroom observations and assessments revealed that students' scores on climate change topics were among the lowest, averaging only 53.75%, suggesting that the topic's abstract nature required more supportive teaching tools.

Based on this context, a community service initiative was conducted to empower teachers by providing training and mentoring in the development of Articulate Storyline-based instructional media. The program focused on the topic of climate change for Grade IV students, a subject that is crucial for environmental awareness yet challenging to teach effectively. Through collaborative design processes, the program helped teachers transform static content into engaging, multimedia learning experiences. The goal was not only to produce quality learning media but also to strengthen the teachers' capacity to develop similar media independently in the future, thus supporting the broader goals of educational reform and digital literacy at the primary education level.

Method

This community service activity employed a participatory development approach that combined literature-based instructional design models with field-based mentoring. The method adopted was based on the ADDIE development model, which includes five phases: Analysis, Design, Development, Implementation, and Evaluation. However, in this activity, the focus was limited to the first four phases—excluding full-scale implementation due to time constraints.

In the analysis stage, a needs assessment was conducted through direct interviews with teachers and classroom observations at Muhammadiyah Ambarbinangun Elementary School. These revealed that teachers faced significant challenges in creating interactive and digital instructional media, particularly on science topics such as climate change. Based on these findings, the development team reviewed relevant literature on multimedia learning principles, instructional media development, and national curriculum policy to ensure the program was grounded in current educational theory and best practices.

During the design stage, the team collaborated with teachers to break down the climate change material into specific learning indicators and mapped them against the curriculum. A flowchart and storyboard were created to guide the construction of digital learning modules using Articulate Storyline. This step was informed by previous research on effective multimedia instruction and guided by current technological trends in digital pedagogy.

The development stage involved creating the actual learning media, combining narration, text, interactive navigation, quizzes, and animation. Validation was then conducted by four types of experts: media, content, instructional design, and language, each providing scores and qualitative feedback. These expert reviews served as a comparison point between the current output and the quality standards established in previous similar research using Articulate Storyline.

Finally, in the evaluation stage, the media was tested on a small group of Year IV students. Pretest and posttest instruments were used to assess students' understanding before and after using the digital media. The analysis of learning outcomes was carried out using the N-Gain score formula, which compares improvements in students' cognitive achievement (Mufidah & Khori, 2021; Firdawela & Reinita, 2021).

Results and Discussions

Results

The digital learning media product using Articulate Storyline is designed to support fourth-grade elementary students in learning about climate change. The media development process was guided by four stages of the ADDIE model: analysis, design, development, and evaluation.

In the analysis stage, the team conducted a needs assessment at Muhammadiyah Ambarbinangun Elementary School through classroom observations and interviews with teachers. The results revealed several challenges: students' low academic performance on the topic of climate change, teachers' limited digital literacy, and the absence of technology-based instructional media aligned with current curriculum demands. These findings underscored the need for innovative and accessible media to support effective teaching and learning.

The design stage focused on aligning the media content with the learning objectives outlined in the Merdeka Curriculum. The development team prepared a detailed content map, flowchart, and storyboard to structure the learning flow and visual presentation. Canva was used to create visuals, backgrounds, and navigation elements, ensuring an engaging and user-friendly interface. The learning media were structured to include narration, animations, and interactive navigation, supporting independent learning.

The development stage involved creating an interactive learning media product using Articulate Storyline, tailored to the outcomes from the design phase, which included a content script, flowchart, storyboard, and climate change material. This stage was carried out through three main phases: pre-production, production, and post-production.

In the pre-production phase, the necessary tools and materials were prepared, including the primary software, Articulate Storyline, and supporting design tools such as Canva to create backgrounds and navigation buttons. Additional materials included a laptop, structured learning content, audio narration, background music, images, and relevant videos to support the development of the media.

The production phase involved assembling and integrating various media components into the Articulate Storyline software. These included navigation icons (home, next, back), narration audio, visuals, and supporting video content. The initial screen of the media displayed the title, target grade level, developer name, and a “Start” button to launch the lesson. The main menu provided interactive buttons leading to learning objectives, content sections, instructions, references, a quiz, developer information, and an exit option. The learning content was organized into subtopics under the theme of climate change, presented sequentially to guide student learning. The evaluation section featured a quiz with a 30-minute time limit, allowing only one attempt to complete the assessment.

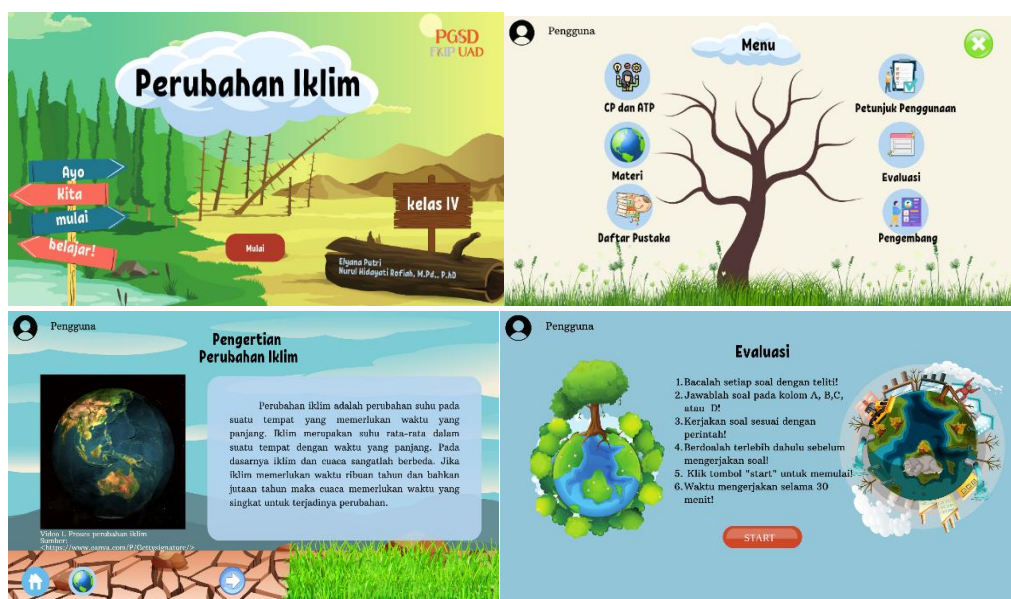


Figure 1. Articulate Storyline Media for Climate Change Education

This development process resulted in a digital learning media product that is interactive, visually engaging, and aligned with the learning objectives of fourth-grade science, particularly in the topic of climate change. The structured navigation, visual clarity, and embedded assessment features make this media an effective instructional tool to enhance students' understanding of environmental issues. To evaluate its effectiveness, the media was implemented in a field trial involving 21 students. Students completed a pretest before using the media and a posttest afterward. The results demonstrated a significant improvement in learning outcomes. The average pretest score was 51.67, which increased to 86.38 in the posttest. The calculated N-Gain score was 0.70, indicating a high level of effectiveness in improving student understanding of climate change concepts. These results support the use of Articulate Storyline as a promising tool for enhancing learning, particularly in primary science education.

Discussion

The implementation of interactive learning media using Articulate Storyline has demonstrated its potential in supporting elementary-level instruction on climate change. The developed media aligns with the principles of the Merdeka Curriculum, which emphasizes contextualized, differentiated, and student-centered learning. Through the integration of multimedia components such as narration, animations, and interactive quizzes, the media helps make abstract scientific concepts more concrete and accessible to young learners.

Instructional media play a crucial role in stimulating students' cognitive, affective, and psychomotor domains (Zaki, 2020). Digital media such as Articulate Storyline fall under interactive computer-based learning tools, offering the advantages of flexibility, engagement, and accessibility (Novak, 2015). Daryanes et al. (2022) emphasizes that Articulate Storyline enables educators to build interactive e-learning content that can be accessed anytime and anywhere, aligning well with the flexible nature of contemporary learning environments.

Evaluation by expert reviewers showed that the developed media was of high quality, with an average score of 90.37%, classified as "Very Good." This indicates that the instructional content, design, navigation, and language used in the media met pedagogical standards. These findings are consistent with those reported by Gutiérrez-Castillo et al. (2023), who highlight the importance of validating digital learning tools through expert judgment to ensure their educational effectiveness.

In terms of learning outcomes, significant improvement was observed. The average pretest score of students before using the media was 51.67, which rose to 86.38 after implementation. The N-Gain score of 0.70 (70.43%) indicates that the media had a high level of effectiveness. Similar results were reported in previous studies such as Saadah et al. (2022) and Rofiah et al. (2024), which showed that media developed with Articulate Storyline significantly improved student academic performance.

Beyond the measurable improvement in student outcomes, the project also helped empower teachers, especially in using technology in classroom settings. Through this programme, teachers were not only introduced to innovative learning tools but also actively involved in planning, designing, and reviewing media. This collaboration allowed teachers to understand better how to align learning materials with curriculum targets and incorporate technology into their pedagogical practices.

Many primary school teachers face challenges in using digital learning tools due to limited training, lack of confidence, or insufficient access to digital resources (Sahelatua et al., 2019). Therefore, the community engagement component of this project addressed those gaps by providing direct assistance and practical experience in educational media development. By participating in this initiative, teachers improved their digital literacy and gained exposure to student-centred instructional design principles and skills that can be applied across various subjects and topics.

This capacity-building aspect is critical in supporting the broader goals of educational reform under the Merdeka Curriculum. When teachers are empowered with the skills and confidence to innovate, they are more likely to design inclusive, adaptive, and creative learning experiences (Kusumawardani et al., 2025; Zulkarnaen et al., 2025). In this way, the project has made a lasting contribution not only by producing a usable digital learning product but also by enhancing the professional competence of educators in the partner school.

Conclusion

This study aimed to develop and implement interactive digital learning media based on Articulate Storyline for teaching climate change material to fourth-grade students. The objectives were to produce a feasible and effective learning tool and to support teacher empowerment through active involvement in media design and use. Based on the results, these objectives were successfully achieved. The developed media received a high average score of 90.37% from expert validation and demonstrated effectiveness in improving student learning outcomes, with an average N-Gain score of 0.70. These findings confirm that the media is both valid and effective for elementary classroom use.

In addition to student improvement, the program empowered teachers by providing opportunities to engage in instructional media design and to strengthen their digital literacy skills. This collaboration between higher education and local schools addressed gaps in access to quality media and teacher capacity, contributing to broader educational goals under the Merdeka Curriculum.

Future initiatives may explore expanding the use of this media to other science topics or grade levels and adapting the design for mobile-friendly access. It is also recommended to conduct follow-up training with teachers to enhance their ability to develop digital instructional tools independently. Improvements in visual accessibility and the integration of gamification features may further increase student engagement. Overall, this study supports the continued development of technology-based learning resources as an integral part of community service and educational innovation.

References

- Daryanes, F., Darmadi, D., Fikri, K., Sayuti, I., Rusandi, M. A., & Situmorang, D. D. B. (2023). The development of articulate storyline interactive learning media based on case methods to train student's problem-solving ability. *Heliyon*, 9(4), 1-14. <https://doi.org/10.1016/j.heliyon.2023.e15082>
- Eikeland, I., & Ohna, S. E. (2022). Differentiation in education: a configurative review. *Nordic Journal of Studies in Educational Policy*, 8(3), 157-170. <https://doi.org/10.1080/20020317.2022.2039351>
- Firdawela, I., & Renita. (2021). Pengembangan Media Pembelajaran Articulate Storyline Menggunakan Model Think Pair Share di Kelas IV Sekolah Dasar. *Jurnal PGSD: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, 14(2), 99-112.
- Gutiérrez-Castillo, J. J., Palacios-Rodríguez, A., Martín-Párraga, L., & Serrano-Hidalgo, M. (2023). Development of digital teaching competence: Pilot experience and validation through expert judgment. *Education Sciences*, 13(52), 1-9. <https://doi.org/10.3390/educsci13010052>
- Hunaepi, H., & Suharta, I. (2024). Transforming education in Indonesia: The impact and challenges of the Merdeka belajar curriculum. *Path of Science*, 10(6), 5026-5039. <https://doi.org/10.22178/pos.105-31>
- Junarti, J., Sholihah, H. I. A., Sari, R. P., Oci, M., & Sumanik, E. D. (2023). Innovation in Educational Technology to Enhance Student Learning Achievement in the Era of the Merdeka Curriculum. *Indonesian Journal of Education (INJOE)*, 3(2), 292-309. <https://www.injoe.org/index.php/INJOE/article/view/69>
- Kusumawardani, I. N., Ghozali, M. A., Unsiyah, F., Degeng, P. D. D., & Isnaini, M. H. (2025). The Psychology of Mindfulness for Pre-Service Teachers Preparation Program. *Kontribusi : Research Dissemination for Community Development*, 8(1), 34-45. <https://doi.org/10.30587/kontribusi.v8i1.8746>
- Lestari, S. (2018). Peran Teknologi dalam Pendidikan Di Era Globalisasi. *EDURELIGIA: Jurnal Pendidikan Agama Islam*, 2(2), 94-100. <https://doi.org/10.33650/edureligia.v2i2.459>

- Marpaung, R. W. (2024). Implementasi Merdeka Belajar dalam meningkatkan kreativitas dan inovasi siswa di era digital. *Indonesian Research Journal on Education*, 4(2), 550-558. <https://doi.org/10.31004/irje.v4i2.677>
- Mills, M., Monk, S., Keddie, A., Renshaw, P., Christie, P., Geelan, D., & Gowlett, C. (2014). Differentiated learning: From policy to classroom. *Oxford review of education*, 40(3), 331-348.
- Mufidah, E., & Khorri, N. (2021). Pengembangan Media Pembelajaran Articulate Storyline Untuk Meningkatkan Hasil Belajar Siswa Sekolah Dasar Di Masa Pandemi Covid 19. *IBTIDA'*, 2(2), 124-132. <https://doi.org/10.37850/ibtida.v2i2.214>
- Novak, E. (2015). A critical review of digital storyline-enhanced learning. *Educational Technology Research and Development*, 63(3), 431-453. <https://doi.org/10.1007/s11423-015-9372-y>
- Pratiwi, E. I., Ismanti, S. P., Zulfa, R. F., Jannah, K., & Fauzi, I. (2023). Impresi Kurikulum Merdeka Belajar Terhadap Pembelajaran SD/MI. *Al-Ibanah*, 8(1), 1-12. <https://doi.org/10.54801/ibanah.v8i1.146>
- Rahmawati, R. D., Khotimah, K., Aprilyanti, V., Fatmawati, A., & Aprillia, L. D. (2022). Penerapan Media Pembelajaran Berbasis Visual Menggunakan Alat Peraga pada Mata Pelajaran Pendidikan Agama Islam di SDN Sumberagung. *Jumat Pendidikan: Jurnal Pengabdian Masyarakat*, 3(3), 124-128. <https://doi.org/10.32764/abdimaspen.v3i3.3366>
- Rianto, R. (2020). Pengembangan Interaktif Berbasis Articulate Storyline 3. *Indonesian Language Education and Literature*, 6(1), 84-92. <https://doi.org/10.24235/ileal.v6i1.7225>
- Rofiah, N. H., Sinta, T. N. A., & Dewi, R. (2024). Development of articulate storyline media for enhancing learning outcomes in natural and social sciences among elementary school students. *Al-Bidayah: Jurnal Pendidikan Dasar Islam*, 16(1), 19-40. <https://doi.org/10.14421/al-bidayah.v16i1.9559>
- Saadah, I. N., Hadi, S., Budiyanto, M. A. K., Rahardjanto, A., & Hudha, A. M. (2022). Development of articulate storyline learning media to improve biology learning outcomes for junior high school students. *Research and Development in Education (RaDEn)*, 2(2), 51-56. <https://doi.org/10.22219/raden.v2i2.23232>
- Sahelatua, L. S., Vitoria, L., & Mislinawati, M. (2019). Kendala guru memanfaatkan media IT dalam pembelajaran di SDN 1 Pagar Air Aceh Besar. *Elementary Education Research*, 4(4). <https://doi.org/10.24815/primary.v4i4.8579>
- Setiyawan, H. (2020). Pemanfaatan Media Audio Visual dan Media Gambar pada Siswa Kelas V. *Jurnal Prakarsa Paedagogia*, 3(2), 198-203. <https://doi.org/10.24176/jpp.v3i2.5874>
- Svari, N. M. F. D., & Arlinayanti, K. D. (2024). Perubahan paradigma pendidikan melalui pemanfaatan teknologi di era global. *Metta: Jurnal Ilmu Multidisiplin*, 4(3), 50-63. <https://doi.org/10.37329/metta.v4i3.3407>
- Umarella, S. (2018). Urgensi media dalam proses pembelajaran. *Jurnal Al-iltizam*, 3(2), 234-241.
- Zaki, A., Yusri, D., (2020). Penggunaan Media Pembelajaran Untuk Meningkatkan Prestasi Belajar Siswa Pada Pelajaran PKN di SMA Swasta Darussa'adah Kec. Pangkalan Susu. *Al-Ikhtibar: Jurnal Ilmu Pendidikan*, 7 (2), 809-820. <https://doi.org/10.32505/ikhtibar.v7i2.618>
- Zulkarnain, Z., Adiputra, S., & Amir, A. (2025). The Implementation of Teachers' Pedagogical Competence in Elementary Schools. *Kontribusi : Research Dissemination for Community Development*, 8(1), 61-69. <https://doi.org/10.30587/kontribusi.v8i1.8985>